Engelhard Corporation
Washington County
Eastport, Maine
A-631-71-H-R/A

Departmental
Findings of Fact and Order
Air Emission License

After review of the air emissions license application, staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A., Section 344 and Section 590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

Engelhard Corporation (Engelhard) of Eastport, Maine has applied to renew their Air Emission License permitting the operation of emission sources associated with their natural pearl essence extraction facility.

Engelhard has also requested an amendment to their license to add a new boiler and a water heater.

B. Emission Equipment

The following equipment is addressed in this air emission license:

Fuel Burning Equipment

Equipment	Maximum Capacity (MMBtu/hr)	Maximum Firing Rate (gal/hr)	Fuel Type, % sulfur	Stack #
Boiler B1	2.6	18.8	K-1 & #2, 0.5%	1
Boiler B3*	1.3	9.4	K-1 & #2, 0.35%	12
Water Heater WH1*	1.1	7.9	K-1 & #2, 0.35%	4

* Designates newly licensed equipment

Process Equipment

Equipment	Production Rate	Pollution Control Equipment	Stack #
P2 Batch Mixer	750 gal/batch guanine concentrate	None	Fugitive
P3 Batch Mixer	175 gal/batch	None	Fugitive
P4 Holding Tank	750 gal process intermediate	None	Fugitive
P5 Transfer Tank	275 gallons	None	Fugitive
P11 Batch Mixer	200 gal/batch	None	Fugitive
P12 Batch Mixer	520 gal/batch	None	Fugitive
P13 Process Holding Tank	525 gal/batch	None	Fugitive
P14 Process Holding Tank	525 gal/batch	None	Fugitive
P15 Batch Pre-Mix	55 gal/batch	None	Fugitive
P16 Process Classification Tank	525 gal/batch	None	Fugitive
P17 Process Feed Tank	525 gal/batch	None	Fugitive
P18 Mill Supply Tank	5 gal/batch	None	Fugitive
P21 Post Mixer	35 gal/batch	None	Fugitive
P22 Process Tank	525 gal/batch	None	Fugitive
P23 Post Mixer	35 gal/batch	None	Fugitive
HM1 Pot Mixer	25 gal/batch	None	Fugitive
HM2 Pot Mixer	25 gal/batch	None	Fugitive
RCFG1 Centrifuge	55 gal/batch	None	Fugitive
RCFG3 Centrifuge	50 gal/batch	None	Fugitive
RCFG7 Centrifuge	50 gal/batch	None	Fugitive

Liquid Organic Material Storage Tanks

Tank Name	Tank Type	Capacity (gallons)	Materials Stored	Annual Throughput (gal/year)	Year of Const.	Control Device
C-16	Fixed Welded	5200	IPA, BuAc, Naphtha, water, guanine and soaps	--*	1962	Conservation Vent
C-17	Fixed Welded	5200	IPA, BuAc, Naphtha, water, guanine and soaps	--*	1962	Conservation Vent
C-18	Fixed Welded	5200	IPA, BuAc, Naphtha, water, guanine and soaps	--*	1962	Conservation Vent
C-19	Fixed Welded	5200	Hazardous Liquid Waste, as needed	--**	1962	Conservation Vent

*Approximately 281 gallons sent for energy recovery in 2004
**0 gallons in 2004

Process Vents

Vent Name	Vent Location	Flow Rate (ft^3/min)
RPV-1 Refining Process Vent	Refining Operation	2675
RPV-2 Refining Process Vent	Refining Operation	3375
RPV-3 Refining Process Vent	Refining Operation	1650

C. Application Classification

The application for Engelhard Corporation includes the licensing of replacement equipment (Boiler #3 replaces Boiler #2) but does not increase the annual facility fuel limit. Therefore, the license is considered to be a renewal plus an amendment to add a boiler and a new water heater, and has been processed through Chapter 115 of the Department's regulations.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in Chapter 100 of the Department regulations. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas. BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in Chapter 100 of the Department's regulations. BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

BPT for existing emissions equipment means that method which controls or reduces emissions to the lowest possible level considering:

- the existing state of technology;
- the effectiveness of available alternatives for reducing emissions from the source being considered; and
- the economic feasibility for the type of establishment involved.

Process Description

The facility extracts guanine (and hypoxanthine) crystals obtained from fisheries-related products, purifies those crystals by reducing extraneous materials, and introduces the crystals into both organic- and aqueous-based market vehicles, to produce either a finished natural pearl essence packaged at the local facility, or an

intermediate natural pearl essence concentrate for further processing and packaging by other facilities of the Engelhard Corporation.

The process naturally divides into two components: Extraction and Refinement. Extraction of the crystals from the seasonally available fisheries-related resource is processed into a form that can be stored until needed for refinement into a final product to meet a customer order. The extraction of the guanine crystals from the fishery-related raw material is completed in two phases. In the first phase, crystals and extraneous water-solubles are removed from the raw material through a series of washes using fresh water. The heavy crystals, plus other solids and semi-solids, are concentrated into a wet slurry by physical means at the end of the first phase. In the second phase of extraction, the crystals, and to a lesser extent, the undesired extraneous solids and semi-solids are further concentrated in a batch mixing tank using fresh water, a surfactant system, and a low-weight aliphatic/alicyclic organic, such as a naphtha. The surfactant assists the organic to efficiently extract and concentrate the crystals from the bulk of the water. This crystal concentrate is subjected to a series of cleansing stages to further reduce extraneous matter from the raw material. The ultimate concentrate is routinely stored as an intermediate product in closed containers for later refining and classifying per customer need.

The refining component of the process consists of subjecting the intermediate concentrate from the extraction operation to a series of washes to reduce the remaining impurities as necessary to meet quality specifications. Simultaneously, the refined concentrate is introduced to a product vehicle appropriate for customer requirements.

The facility produces two principal market types of product: aqueous-based and organic-based. In the organic-based process, market-oriented vehicles such as butyl acetate, isopropanol, and butylene glycol are used. For the organic line, other than batch-mixing the crystals into the vehicle, VOC-type process materials, such as butyl acetate and isopropanol, are stored and handled in a closed system. The batch mixing vessels are covered when possible.

Ancillary recovery of guanine crystals from both the organic- and aqueous-based process liquors is conducted by physical means. Spent organic process liquor is shipped off-site. Spent aqueous process liquor is treated onsite.

B. Boiler B1

Boiler B1 is operated primarily for facility heat and hot water needs. The boiler has a maximum heat input capacity of 2.6 MMBtu/hr, and fires K-1 and #2 fuel oil, each with a sulfur content not to exceed 0.5% by weight. The boiler is not subject to the New Source Performance Standards (NSPS) Subpart Dc for steam generating units greater than 10 MMBtu/hr manufactured after June 9, 1989.

A summary of the BPT analysis for Boiler B1 (18.8 gallons/hr) is the following:

1. The total annual fuel use for the facility (based on a 12 month rolling total) shall not exceed 50,000 gal/year of #2 fuel oil or kerosene (K1). The sulfur content of the fuel fired in Boiler B1 shall not exceed 0.5% by weight.
2. Chapter 106 regulates fuel sulfur content, however in this case a BPT analysis for SO_2 determined a more stringent limit of 0.5% was appropriate and shall be used.
3. NOx emission limits are based on data from similar #2 fired boilers of this size and age.
4. PM_{10}, CO and VOC emission limits are based upon AP-42 data dated 9/98. The PM emissions are based on PM_{10} data.
5. Visible emissions from Boiler B1 shall not exceed 20% opacity on a 6-minute block average, except for no more than one 6-minute block average in a continuous 3-hour period.

C. Boiler B3

Engelhard is proposing to install Boiler B3 to replace the existing Boiler B2, located in Building 28. Boiler B3 will be operated primarily for facility heat and hot water needs. The boiler has a maximum heat input capacity of 1.3 MMBtu/hr, and fires K-1 and #2 fuel oil, each with a sulfur content not to exceed 0.35% by weight. The boiler is not subject to the New Source Performance Standards (NSPS) Subpart Dc for steam generating units greater than 10 MMBtu/hr manufactured after June 9, 1989.

A summary of the BACT analysis for Boiler B3 (9.4 gallons/hr) is the following:

1. The total annual fuel use for the facility (based on a 12 month rolling total) shall not exceed 50,000 gal/year of #2 fuel oil or kerosene (K1). The sulfur content of the fuel fired in Boiler B2 shall not exceed 0.35% by weight.
2. Chapter 106 regulates fuel sulfur content, however in this case the BACT analysis for SO_2 determined a more stringent limit of 0.35% was appropriate and shall be used.
3. NOx emission limits are based on data from similar #2 fired boilers of this size and age.
4. PM_{10}, CO and VOC emission limits are based upon AP-42 data dated 9/98. The PM emissions are based on PM_{10} data.
5. Visible emissions from Boiler B3's stack shall not exceed 20% opacity on a 6-minute block average, except for no more than one 6-minute block average in a continuous 3-hour period.

D. Water Heater WH1

Water Heater WH1 was installed in 2000, but was inadvertently omitted from the Air Emission License. The water heater is operated to supply facility hot water

needs. It has a maximum heat input capacity of 1.1 MMBtu/hr, and fires K-1 and #2 fuel oil, each with a sulfur content not to exceed 0.35% by weight.

A summary of the BACT analysis for Water Heater WH1 (7.9 gallons/hr) is the following:

1. The total annual fuel use for the facility (based on a 12 month rolling total) shall not exceed 50,000 gal/year of #2 fuel oil or kerosene (K1). The sulfur content of the fuel fired in Water Heater WH1 shall not exceed 0.35% by weight.
2. Chapter 106 regulates fuel sulfur content, however in this case the BACT analysis for SO_2 determined a more stringent limit of 0.35% was appropriate and shall be used.
3. NOx emission limits are based on data from similar #2 fired units of this size and age.
4. PM_{10}, CO and VOC emission limits are based upon AP-42 data dated 9/98. The PM emissions are based on PM_{10} data.
5. Visible emissions from Water Heater WH1's stack (stack 4) shall not exceed 20% opacity on a 6-minute block average, except for no more than one 6-minute block average in a continuous 3-hour period.

E. Process Equipment and Process Vents

Engelhard operates several process units that create fugitive emissions. These units shall not exceed 20% opacity, except for no more than five minutes in any 1-hour period. Compliance shall be determined by an aggregate of the individual 15-second opacity observations which exceed 20% in any one hour.

There are three process vents (RPV-1, RPV-2 and RPV-3) that vent emissions from the refining operation. Each vent RPV-1, RPV-2 and RPV-3 shall not exceed 20% opacity on a 6-minute block average basis, except for no more than one 6-minute block average in a 1-hour period.

F. VOC RACT

Engelhard is subject to the VOC RACT requirements of MEDEP Chapter 134. The facility source specific VOC RACT requires the following:

- A record of the VOC content of the following extraction solution quantities (gallons) and also the VOC content of each quantity (lb VOC/gallon), and any other applicable information, for each of the following:

    i. Beginning of the month facility storage
    ii. Monthly facility purchases

iii. End of the month facility storage (equal to the beginning of the month storage for the following month)
iv. Quantity shipped off-site.

- A limit of 20.0 tons/year VOC emitted from the pearl extraction process, on a 12-month rolling total basis, and calculated on a monthly and 12-month rolling total basis based on the following equations:

Monthly VOC Emissions = (A x VOC content) + (B x VOC content) – (C x VOC content) – (D x VOC content)

Where:
A = Beginning of the month facility storage
B = Monthly facility purchases
C = End of month facility storage
D = Quantity shipped off-site

12-month rolling total VOC Emissions = Sum of the previous twelve months' Monthly VOC Emissions (calculated above).

- The use of aqueous-based extraction liquor (98-100% water-based and 0-2% natural or synthetic organics, by weight) whenever possible.

- The operation and maintenance of conservation vents on the four Refining Solution Storage Tanks (Tanks C-16, C-17, C-18 and C-19) when the tanks are in use. The refining vents reduce fugitive breathing losses from the tanks by preventing the vapors from escaping unless the pressure inside the tanks exceeds a safe operating level. (Engelhard's original VOC RACT specified conservation vents be operated on the Phase Separator, the three Centrifuges, the Refining Process Tank, the Process Extraction Tank, and the Process Mulch Tanks. This equipment is either not still in use by Engelhard or no longer used with organic-based extraction solution, therefore conservation vents are required on the Refining Solution Storage Tanks only.)

G. Annual Emissions
Annual emissions are calculated based on the following:

- The firing of 50,000 gallons of #2 fuel on a 12-month rolling total basis, and with a sulfur content not to exceed 0.5% by weight; and,
- A limit of 20.0 tons/year of VOC from the pearl extraction process, on a 12-month rolling total basis.

Engelhard shall be restricted to the following annual emissions, based on a 12 month rolling total:

Total Licensed Annual Emission for the Facility
Tons/year
(used to calculate the annual license fee)

	PM	**PM_{10}**	**SO_2**	**NOx**	**CO**	**VOC**
Boilers	1.4	1.4	0.71	1.1	0.13	0.01
Extraction Process	--	--	--	--	--	20.0
Total TPY	**1.4**	**1.4**	**0.71**	**1.1**	**0.13**	**20.01**

III. AMBIENT AIR QUALITY ANALYSIS

According to the Maine Regulations Chapter 115, the level of air quality analyses required for a renewal source shall be determined on a case-by case basis. Based on the above total facility emissions, Engelhard is below the emissions level required for modeling and monitoring.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-631-71-H-R/A subject to the following conditions:

STANDARD CONDITIONS

(1) Employees and authorized representatives of the Department shall be allowed access to the licensee's premises during business hours, or any time during which any emissions units are in operation, and at such other times as the Department deems necessary for the purpose of performing tests, collecting samples, conducting inspections, or examining and copying records relating to emissions (38 MRSA §347-C).

(2) The licensee shall acquire a new or amended air emission license prior to commencing construction of a modification, unless specifically provided for in Chapter 115. [MEDEP Chapter 115]

(3) Approval to construct shall become invalid if the source has not commenced construction within eighteen (18) months after receipt of such approval or if construction is discontinued for a period of eighteen (18) months or more. The Department may extend this time period upon a satisfactory showing that an extension is justified, but may condition such extension upon a review of either the control technology analysis or the ambient air quality standards analysis, or both. [MEDEP Chapter 115]

(4) The licensee shall establish and maintain a continuing program of best management practices for suppression of fugitive particulate matter during any period of construction, reconstruction, or operation which may result in fugitive dust, and shall submit a description of the program to the Department upon request. [MEDEP Chapter 115]

(5) The licensee shall pay the annual air emission license fee to the Department, calculated pursuant to Title 38 M.R.S.A. §353. [MEDEP Chapter 115]

(6) The license does not convey any property rights of any sort, or any exclusive privilege. [MEDEP Chapter 115]

(7) The licensee shall maintain and operate all emission units and air pollution systems required by the air emission license in a manner consistent with good air pollution control practice for minimizing emissions. [MEDEP Chapter 115]

(8) The licensee shall maintain sufficient records to accurately document compliance with emission standards and license conditions and shall maintain such records for a minimum of six (6) years. The records shall be submitted to the Department upon written request. [MEDEP Chapter 115]

(9) The licensee shall comply with all terms and conditions of the air emission license. The filing of an appeal by the licensee, the notification of planned changes or anticipated noncompliance by the licensee, or the filing of an application by the licensee for a renewal of a license or amendment shall not stay any condition of the license. [MEDEP Chapter 115]

(10) The licensee may not use as a defense in an enforcement action that the disruption, cessation, or reduction of licensed operations would have been necessary in order to maintain compliance with the conditions of the air emission license. [MEDEP Chapter 115]

(11) In accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department, the licensee shall:

A. perform stack testing to demonstrate compliance with the applicable emission standards under circumstances representative of the facility's normal process and operating conditions:
   1. within sixty (60) calendar days of receipt of a notification to test from the Department or EPA, if visible emissions, equipment operating parameters, staff inspection, air monitoring or other cause indicate to the Department that equipment may be operating out of compliance with emission standards or license conditions; or
   2. pursuant to any other requirement of this license to perform stack testing.

B. install or make provisions to install test ports that meet the criteria of 40 CFR Part 60, Appendix A, and test platforms, if necessary, and other accommodations necessary to allow emission testing; and

C. submit a written report to the Department within thirty (30) days from date of test completion.

[MEDEP Chapter 115]

(12) If the results of a stack test performed under circumstances representative of the facility's normal process and operating conditions indicate emissions in excess of the applicable standards, then:

A. within thirty (30) days following receipt of such test results, the licensee shall re-test the non-complying emission source under circumstances representative of the facility's normal process and operating conditions and in accordance with the Department's air emission compliance test protocol and 40 CFR Part 60 or other method approved or required by the Department; and

B. the days of violation shall be presumed to include the date of stack test and each and every day of operation thereafter until compliance is demonstrated under normal and representative process and operating conditions, except to the extent that the facility can prove to the satisfaction of the Department that there were intervening days during which no violation occurred or that the violation was not continuing in nature; and

C. the licensee may, upon the approval of the Department following the successful demonstration of compliance at alternative load conditions, operate under such alternative load conditions on an interim basis prior to a demonstration of compliance under normal and representative process and operating conditions.

[MEDEP Chapter 115]

(13) Notwithstanding any other provisions in the State Implementation Plan approved by the EPA or Section 114(a) of the CAA, any credible evidence may be used for the purpose of establishing whether a person has violated or is in violation of any statute, regulation, or Part 70 license requirement. [MEDEP Chapter 115]

(14) The licensee shall maintain records of malfunctions, failures, downtime, and any other similar change in operation of air pollution control systems or the emissions

unit itself that would affect emission and that is not consistent with the terms and conditions of the air emission license. The licensee shall notify the Department within two (2) days or the next state working day, whichever is later, of such occasions where such changes result in an increase of emissions. The licensee shall report all excess emissions in the units of the applicable emission limitation. [MEDEP Chapter 115]

(15) Upon written request from the Department, the licensee shall establish and maintain such records, make such reports, install, use and maintain such monitoring equipment, sample such emissions (in accordance with such methods, at such locations, at such intervals, and in such a manner as the Department shall prescribe), and provide other information as the Department may reasonably require to determine the licensee's compliance status. [MEDEP Chapter 115]

SPECIFIC CONDITIONS

(16) **Boilers B1, B3 and WH1**

A. Total fuel use for the boilers and the water heater shall not exceed a total of 50,000 gallons/year of K-1 and #2 fuel oil. Fuel oil fired in Boiler B1 shall not exceed a sulfur content of 0.5% by weight. Fuel oil fired in Boiler B3 shall not exceed a sulfur content of 0.35% by weight. Compliance shall be demonstrated by fuel records from the supplier showing the quantity of fuel delivered and the percent sulfur of the fuel. Records of annual fuel use shall be kept on a 12-month rolling total basis. [MEDEP Chapter 115, BPT]

B. Emissions shall not exceed the following [MEDEP Chapter 115, BPT]:

Emission Unit	**PM (lb/hr)**	**PM_{10} (lb/hr)**	**SO_2 (lb/hr)**	**NOx (lb/hr)**	**CO (lb/hr)**	**VOC (lb/hr)**
Boiler B1	7.43	7.43	0.53	0.78	0.10	0.01
Boiler B3	3.76	3.76	0.27	0.40	0.05	0.01
Water Heater WH1	3.15	3.15	0.23	0.33	0.04	0.01

C. Visible emissions from each of the Boiler B1, Boiler B3 and Water Heater WH1 shall not exceed 20% opacity on a 6-minute block average, except for no more than one 6-minute block average in a continuous 3-hour period. [MEDEP Chapter 101]

(17) **Fugitive Emissions**

Visible emissions from Engelhard's Process Equipment fugitive emission sources (including Process Units P2 – P5, P11 – P18, P21 – P23, HM1, HM2, and RFCG1, RFCG3 and RFCG7) as well as stockpiles and roadways shall not exceed

20% opacity, except for no more than five (5) minutes in any 1-hour period. Compliance shall be determined by an aggregate of the individual fifteen (15)-second opacity observations which exceed 20 percent in any one (1) hour. [MEDEP Chapter 101]

(18) **General Process Sources**

Visible emissions from any general process source (including but not limited to Process Vents RPV1 – RPV3) shall not exceed an opacity of 20% on a six (6) minute block average basis, except for no more than one 6-minute block average in a 1-hour period. [MEDEP Chapter 101]

(19) **VOC RACT**

Engelhard is subject to the VOC RACT requirements of MEDEP Chapter 134. The facility source specific VOC RACT requires the following:

A. A record of the VOC content of the following extraction solution quantities (gallons) and also the VOC content of each quantity (lb VOC/gallon), and any other applicable information, for each of the following:

i. Beginning of the month facility storage
ii. Monthly facility purchases
iii. End of the month facility storage (equal to the beginning of the month storage for the following month)
iv. Quantity shipped off-site.

B. A limit of 20.0 tons/year VOC emitted from the pearl extraction process, on a 12-month rolling total basis, and calculated on a monthly and 12-month rolling total basis based on the following equations:

Monthly VOC Emissions = (A x VOC content) + (B x VOC content) – (C x VOC content) – (D x VOC content)

Where:

A = Beginning of the month facility storage
B = Monthly facility purchases
C = End of month facility storage
D = Quantity shipped off-site

12-month rolling total VOC Emissions = Sum of the previous twelve months' Monthly VOC Emissions (calculated above).

C. The use of aqueous-based extraction liquor (98-100% water-based and 0-2% natural or synthetic organics, by weight) whenever possible.

D. The operation and maintenance of conservation vents on the four Refining Solution Storage Tanks (Tanks C-16, C-17, C-18 and C-19) when the tanks are in use.

(20) **Malfunctions and Breakdowns**

Engelhard shall notify the Department within 48 hours and submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component causes a violation of any emission standard (38 MRSA §605).

(21) **Payment of Annual License Fee**

Engelhard shall pay the annual air emission license fee within 30 days of November 30th of each year. Pursuant to 38 MRSA §353-A, failure to pay this annual fee in the stated timeframe is sufficient grounds for revocation of the license under 38 MRSA §341-D, subsection 3.

DONE AND DATED IN AUGUSTA, MAINE THIS DAY OF 2005.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____
DAWN R. GALLAGHER, COMMISSIONER

The term of this license shall be five (5) years from the signature date above.

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: March 18, 2005
Date of application acceptance: March 22, 2005

Date filed with the Board of Environmental Protection: _____

This Order prepared by Rachel E. Pilling, Bureau of Air Quality.